

Patterns of Multiple Substance Abuse During Pregnancy: Implications for Mother and Fetus

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ABSTRACT: This paper describes patterns of drug use such as choice of drug, other substances abused, and route of administration in 174 women who reported methamphetamine, cocaine, heroin, or "Ts and blues" abuse during pregnancy. Seventy-five percent (130/174) reported using more than one drug. Other than tobacco, alcohol and cocaine were the drugs most frequently used in combination with other drugs (7% to 53% and 12% to 54% of the time, respectively). The extent of polydrug use observed in this study emphasizes (1) the difficulty in ascribing adverse maternal or fetal health effects to single substances, and (2) the potential for interaction effects due to multiple substance abuse.

SUBSTANCE ABUSE during pregnancy is an important cause of abnormal intrauterine development of the fetus, and research in this area is a priority public health problem. Two commonly abused substances, cocaine and alcohol, have been implicated as human teratogens.^{1,2} Most studies have focused on a single substance, with little attention to the possible adverse effects of multidrug or polydrug use. We have previously reported our experience with the effects on the mother and the neonate in cases of maternal abuse of methamphetamine,³ cocaine,⁴ heroin,⁵ and "Ts and blues"^{*6} during pregnancy.

We reviewed patterns of substance abuse during pregnancy with regard to age, ethnicity, and other substances used in association with methamphetamine, cocaine, heroin, and Ts and blues in one of the largest obstetric services in the United States that provides medical care for a primarily indigent (<5% pay for their health care) patient population. The objective is to elucidate the degree to which the abuse of these drugs occurs concomitantly with the use of other substances that have been associated with maternal complications or have teratogenic potential.

METHODS AND MATERIALS

Subjects in this study were pregnant women who abused drugs and whose infants were delivered at Parkland Memorial Hospital, Dallas, Tex, between Jan 1 and Dec 31, 1987. A total of 197 women who abused drugs were identified by passive self-report (ie, information was not actively solicited). Data were abstracted from detailed social worker interviews recorded in the medical record and verified by information recorded by other medical personnel. Women who reported use of more than one drug had been asked to identify the substance they used most frequently. This drug was considered to be the primary drug of abuse. Fourteen women who denied drug use during the current pregnancy in reports to other medical personnel were excluded; also excluded were nine women for whom no primary drug of abuse could be determined. This left 174 women in the study group. Details regarding adverse effects on pregnancy of methamphetamine, cocaine, and heroin in some of these patients have been reported previously.³⁻⁶

Analysis of variance (ANOVA) was used to test the significance of differences in age between different drug use groups. Newman-Kreuls test (Q) was used to make multiple comparisons of maternal age between drug groups. Chi-square with Yates' correction (χ^2_y) for sample size was used to test the differences in frequency of the use of alcohol and/or cocaine with other substances of abuse. Differences in frequency were expressed in terms of the odds ratio (OR). Statistical calculations were performed by UTSTAT (ANOVA and

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*"Ts and blues" are a popular street mixture of pentazocine (Talwin) and an antihistamine that comes in a blue tablet, tripelemnamine (Pyribenzamine). The tablets are crushed and dissolved in an aqueous solution for intravenous injection. The mixture is often substituted for heroin and was first used by heroin addicts in Chicago's inner city.

TABLE 1. Characteristics of 174 Pregnant Drug Abusers by Primary Drug of Abuse

	Methamphetamine <i>n</i> = 68	Cocaine <i>n</i> = 65	Heroin <i>n</i> = 24	Ts & Blues <i>n</i> = 17
Age (mean \pm SD), years	23.4 \pm 4.5	25.2 \pm 4.8	28.3 \pm 4.3	26.6 \pm 4.2
Range	15-35	16-37	19-39	19-35
Race				
White	64 (94%)	26 (40%)	8 (33%)	
Black	2 (3%)	36 (55%)	13 (54%)	17 (100%)
Hispanic	2 (3%)	3 (5%)	3 (13%)	
Route				
Intravenous	64 (94%)	56 (86%)	24 (100%)	17 (100%)
Intranasal	3 (5%)	5 (8%)		
Smoke		4 (6%)		
Oral	1 (2%)			

Newman-Kreuls) and the Centers for Disease Control Statistical Analysis System (χ^2 and OR).

These data have several limitations. We relied entirely on self-report for the admission of drug abuse and information on types of drugs used. In addition, frequency of drug use was reported to be daily, but we had no way to verify this contention. Finally, we do not know if or what biases were introduced by women who self-selected themselves out of the study by inaccurately reporting drug use.

RESULTS

Characteristics of 174 pregnant women who abused drugs are summarized by primary drug of abuse in Table 1. In 1987, approximately 85% of the hospital's obstetric patients received some prenatal care, and 83% of the pregnant drug abusers had some prenatal care. Those who used heroin were significantly older (mean 28.3 years; $P < .01$) than those who used either cocaine or methamphetamine, while those who used methamphetamine were significantly younger

(mean, 23.4 years; $P < .05$) than those in any other group.

Approximately 94% of the women who reported methamphetamine abuse were white. The substances they reported using most frequently with methamphetamine were tobacco (54%), marijuana (37%), and cocaine (12%). Approximately one half (55%) of those who used cocaine were black. The four substances most frequently used by black cocaine-abusing mothers were tobacco (53%), alcohol (11%), heroin (8%), and marijuana (8%). Among white women who used cocaine, the four most frequently used additional substances were tobacco (46%), methamphetamine (42%), marijuana (35%), and alcohol (27%). Black women and white women who were heroin abusers (respectively) also used cocaine (62% and 25%), alcohol (38% and 25%), methadone (8% and 63%), and tobacco (62% and 35%). Those who used Ts and blues were exclusively black in this study; they also reported use of alcohol (53%), cocaine (12%), marijuana (12%), and methamphetamine (6%).

TABLE 2. Frequency of Cocaine and Alcohol Use With Other Substances (N = 174 Abusers)

	<i>n/N</i>	(%)	Methamphetamine (OR)	Cocaine (OR)	Heroin (OR)	Ts & Blues (OR)
Alcohol use						
Methamphetamine	5/68	(7.4)		2.9	5.2*	14.2†
Cocaine	12/65	(18.5)	2.9		1.8	5.0*
Heroin	7/24	(29.2)	5.2*	1.8		2.7
Ts & blues	9/17	(52.9)	14.2†	5.0**	2.7	
Total	33/174	(19.0)				
Cocaine use						
Methamphetamine	8/68	(11.8)			8.9†	1.0
Heroin	13/24	(54.2)	8.9†			8.9**
Ts & blues	2/17	(11.8)				
Total	23/109	(21.1)				
Cocaine & alcohol use						
Methamphetamine	5/68	(7.4)			5.2*	1.8
Heroin	7/24	(29.2)	5.2*			1.7
Ts & blues	2/17	(11.8)				
Total	19/109	(17.4)				

OR = Odds ratio.

* $P < .05$.

† $P < .001$.

** $P < .01$.

Overall, 130 of the women (75%) reported that they used more than one drug during pregnancy. Other than tobacco, alcohol and cocaine were the most frequently used secondary and tertiary drugs. The frequency of alcohol and/or cocaine use during pregnancy differs considerably by primary drug of abuse. Abusers of heroin and Ts and blues used alcohol 5.2 (χ^2 , 5.6; $P < .05$) and 14.2 (χ^2 , 17.4; $P < .001$) times more frequently, respectively, than did those who abused methamphetamine (Table 2). Abusers of heroin used cocaine 8.9 times more frequently (χ^2 , 15.8; $P < .001$) than abusers of methamphetamine or Ts and blues (χ^2 , 6.0; $P < .01$). In addition, abusers of heroin used both alcohol and cocaine 5.2 times more frequently (χ^2 , 5.6; $P < .01$) than did abusers of methamphetamine.

DISCUSSION

The concomitant use of several substances that have teratogenic potential has serious implications for the risks associated with drug abuse during pregnancy. Growth retardation appears to be more severe and the frequency of congenital anomalies seems increased in offspring of mothers who abuse multiple substances.⁷ Moreover, the primarily intravenous use of these drugs compounds the risk of maternal HIV infection being transmitted to the fetus perinatally.

Our results indicate that, in order of magnitude, infants born to women who abuse Ts and blues, heroin, and cocaine are at greatest risk for birth defects attributable to alcohol abuse. Abusers of heroin use cocaine in association with their drug of choice significantly more frequently than abusers of any other drug in the study, probably because a mixture called "speedball"* is very popular. Infants born to abusers of heroin and cocaine are at an 8.9 times greater risk of cocaine-induced damage to the embryo or fetus than infants born to abusers of other drugs, except, of course, for infants born to abusers of cocaine alone.

Alcohol is a known teratogen,¹ and cocaine is a suspected teratogen.^{2,4} Infants born to abusers of heroin are exposed to cocaine and alcohol five times more often than those born to abusers of methamphetamine. From these data it is apparent that alcohol may be an important contributor to the risk of congenital anomalies and growth retardation in infants born to drug abusers, particularly those who abuse Ts and blues or heroin.

Moreover, with the use of multiple substances, the possibility of drug-drug and drug-alcohol interactions exists. It is not known whether alcohol and cocaine interact to cause more severe damage to the conceptus.

Abruptio placentae and premature birth are a risk for women who abuse cocaine^{8,9} and heroin,¹⁰ and probably for other pregnant women who also use heroin and/or cocaine. Similarly, alcohol is used frequently by those who also abuse cocaine, heroin, and Ts and blues and may cause such maternal complications as premature labor.¹¹

No increase in frequency of congenital anomalies was seen among infants born to abusers of methamphetamine,³ but an increase was noticed among infants born to those who abused cocaine.⁴ Heroin use during pregnancy has been associated with an increased frequency of congenital anomalies in one study,¹⁰ but not in several others.⁵ It is possible that differing rates of other substance abuse (eg, alcohol and/or cocaine) contributed in part to differences in congenital anomaly prevalence among studies of heroin use during pregnancy, although this is speculation. The frequency of congenital anomalies among infants born to abusers of Ts and blues was not increased in two studies,^{12,13} but was increased among infants in another study.⁶ The increased frequency of congenital anomalies in that study was attributed to the mother's heavy alcohol consumption in addition to her use of Ts and blues.

We conclude that any analysis of maternal or infant complications resulting from substance abuse during pregnancy must include statistical models that consider the possible confounding effects of the use of other substances.

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*"Speedball" is a mixture of heroin and cocaine (it sometimes includes amphetamine or methamphetamine) that is injected intravenously.

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significant advantages over the Bankart suture repair. Considering the potential complications associated with staple use around the glenohumeral joint, we recommend strict adherence to proper technique and staple size selection when staples are used. When practical, other methods of fixation are preferable.

CONCLUSIONS

The anterior staple capsulorrhaphy is successful in preventing future dislocations. The operation allows most athletes a satisfactory return to athletic participation. Proper staple positioning and fixation is crucial for attaining satisfactory results. Shoulder function is significantly improved but is seldom restored to completely normal. Some degree of apprehension persists in 50%. Staple malpositioning or loosening is common and can cause clinical problems. Predrilling cortical bone may facilitate proper staple positioning without compromising fixation strength. Varying the direction of force application during staple insertion weakens the fixation of the staple to bone. Proper staple selection and attention to technical detail is important for proper results. Because of the added risks associated with staple use in and about the shoulder joint, we recommend other techniques of fixation when practical, and advise strict adherence to proper technique and staple selection when using staples.

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